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EXAMINER YL, STELLA KIM				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/525,677

Applicant(s)

TAKANO ET AL.

Examiner

Stella Yi

Art Unit

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 September 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. The Amendment filed September 19, 2008 has been entered and fully considered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-5, 7-11, and 15-21, are rejected under 35 U.S.C. 103(a) as being unpatentable over LI et al. (5,112,667) in view of DENOMMEE et al. (3,956,447).

Regarding claims 1, 3, and 9, LI et al. discloses a method of producing a helmet (molded article) of a unidirectional (continuous single direction) fiber-reinforced composite material by simultaneously molding a plurality of sheets of prepreg cut out in a predetermined shape (Col.4, lines 9-15 and Abstract), the method characterized by including the steps of:

(1) the said helmet uses a plurality of prepreg layers cut into patterns (22-Figs.7 and 8) (Col.3, lines 34-39) that has plurality of notches or cutouts (26-Fig.7) in respective prepreps so as to form at least one set of partially separated flap and a residual portion (30-Fig.7) for each prepreg; and

(2) the patterns of the said prepreg layers contain cuts which enable the pattern to take a three-dimensional shape and have the cut portions having edges which

substantially close up to form seams when formed into a shell using compression type molding or stamping mold (Col.3, lines 39-43; Col.4, lines 9-15) (forming a desired three-dimensional shape by pressing the partially separated flaps of the respective prepregs).

LI et al. is silent to arranging the prepregs at predetermined portions of a press die using partially separated flaps of the prepregs as positioning pieces. However, LI et al. discloses that a plurality of patterns of said prepreg layers can be "laid-up", that is placed upon one another and placed into a compression type mold (press mold) (Col.4, lines 9-13). It would have been obvious to one of ordinary skill in the art to have arranged the prepregs on a press die using any type of positioning methods as long as the prepregs are positioned on the press mold to achieve the desired structure of the molded article. In addition, Figure 3 shows prepregs molded into the shell 12. It is inherent to position the separated flaps over the press mold to obtain the shape of the said shell 12.

LI et al. is silent to overlapping end edge parts of residual portions (30-Fig.7) on the partially separated flaps and pressing them. However, DENOMMEE et al. discloses a method of making ballistic-resistant helmet where the arms of a star-shaped prepreg pattern are rotated in successive layers of the patterns so that partial overlapping occurs and that the spaces cut out between the arms of the star-shaped patterns are covered by portions of succeeding superimposed layers and that the effective number of layers of fabric in the final molded article will be somewhat greater in the areas near the perimeter of the stack of superimposed patterns as well as in the area near the

perimeter of the preform produced therefrom (Col.2, lines 57-67) and then placing the superimposed patterns on a compression mold (Col.9, lines 24-25). It would have been obvious to one of ordinary skill in the art to have modified the method of producing the helmet of LI et al. to include overlapping the arms or flaps of a star-shaped pattern of prepreg layers as disclosed by DENOMMEE et al. in order to produce a smooth edged and high ballistic resistant helmet (Col.2, lines 11-18).

LI et al. is silent to two pressing steps. However, DENOMMEE et al. discloses a two-step compression molding procedure (Col.4, lines 56-69). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method of producing a helmet (molded article) of a fiber-reinforced composite material of LI et al. to include a second compression molding step as taught by DENOMMEE et al. in order to remove substantially all gases from a preform during the first stage of the finish molding, the degassing avoids the formation of trapped pockets of gas in the final molded article with resulting weaknesses in the article (Col.4, lines 68 through Col.5, lines 1-2).

Regarding claim 2, LI et al. does not explicitly disclose laminating the said prepregs. However, DENOMEE et al. discloses a method of making deep drawn, laminated, non-metallic articles having high ballistic-resistance, and more particularly deep drawn, laminated, non-metallic, ballistic-resistant helmets (Col.1, lines 11-14). DENOMEE et al. discloses that it is desirable to superimpose one or more lamina of the prepreg and cut to a suitable outlined shape such as the said star-shaped pattern that comprises arms or flaps (Col.5, lines 63-68; Col.6, lines 1-6). It would have been

obvious to one of ordinary skill in the art to have modified the method of producing the helmet of LI et al. to include laminating the prepreg layers as disclosed by DENOMMEE et al. in order to produce a smooth edged and high ballistic resistant helmet (Col.2, lines 11-18).

Regarding claims 4, LI et al. discloses that the shapes of the partially separated flaps formed in the respective prepreps are similar to or coincident with one another as illustrated in Figures 7 and 8. LI et al. is silent to shifting the notches or cutouts. However, DENOMMEE et al. discloses that upon being placed in the compression mold, the patterns of the prepreg overlap to cover spaces formed in the individual patterns by the cutting (Col.6, lines 14-18). Therefore, it would have been obvious to one of ordinary skill in the art to have shifted the notches or cutouts of the prepreg layers of LI et al. in order to cover the cutout spaces of previous prepreg layers placed on the press mold and to produce a high ballistic resistant helmet (Col.6, lines 20-24).

Regarding claim 5, LI et al. discloses that the shapes of the partially separated flaps formed in the respective prepreps are similar to or coincident with one another as illustrated in Figures 7 and 8. LI et al. is silent to the manner of which the notches or cutouts were formed. However, LI et al. discloses in Figure 7, the widths of the said notches or cutouts (26) are equal. Therefore, it would have been obvious to one of ordinary skill in the art that the width of the partially separated flap to be arranged in a concave face side of the molded article by pressing would not be narrower than the width of the partially separated flap to be arranged in a convex face side.

Regarding claim 7, LI et al. discloses the width of the partially separated flaps formed by the notches or cutouts is made to be parallel toward the outer circumference (See Figure 7 and 8).

Regarding claim 8, LI et al. discloses that reinforcing fiber to be employed for the prepreg can be carbon fiber (Col.4, line 59).

Regarding claims 10, 11, 15, and 16 LI et al. discloses matrix resin to be employed for the prepreg is a thermosetting resin such as an epoxy resin (Col.9, lines 25-32).

Regarding claims 17-18, and 21, LI et al. discloses heating and pressurizing the molded article (Col.9, lines 49-55).

Regarding claims 19-20, LI et al. discloses compression molding is carried out at molding pressures of 30 to 90 tons and molding time in 15 minutes to 90 minutes and a molding temperature of 80 to 130 degree Celsius (Col.4, lines 19-21).

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over LI et al. (5,112,667) in view of DENOMMEE et al. (3,956,447) as applied to claims 1-5, 7-11, and 15-21 above and in further view of SAKAI et al. (4,990,207).

The teachings of LI et al. and DENOMMEE et al. are applied as described above for claims 1-5, 7-11, and 15-21.

Modified LI et al. is silent to the cut edges in the center side of the notches or cutouts being spaced at a distance of 2 mm or longer from one another. However, SAKAI et al. discloses a process for producing fiber-reinforced thermoplastic article

where the notch to notch spacing is between 2 to about 30 mm and that the length and patterns of the notches may be selected in view of this range to be most effective for the filling ability of the prepreg and flowability of the fiber (Col.4, lines 59-64). Therefore it would have been obvious to one of ordinary skill in the art to have formed the notches or cutouts of modified LI et al. in such a manner that cut edges are spaced at distance of 2 mm or longer from one another in order to eliminate warpage, torsion or scattering of strength of the molded article so that a high quality, high strength molded article of fiber-reinforced thermoplastic article may be produced (Col.6, lines 48-51).

5. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over LI et al. (5,112,667) and DENOMMEE et al. (3,956,447) as applied to claims 1-11 and 15-21, and in further view of AMERONGEN (3,547,764).

The teachings of LI et al. and DENOMMEE et al. are applied as described above for claims 1-11 and 15-21.

Regarding claim 12, LI et al. does not explicitly disclose an epoxy resin comprising components A, B, C, and D. However, AMERONGEN discloses an epoxy resin comprising an epoxy resin (Col.3, lines 65-66), amine compounds comprising sulfur atoms (Col.4, lines 15-18), a urea compound (Col.6, line 27), and a dicyanodiamide (Col.8, line 9). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the epoxy resin of LI et al. to include the epoxy resin of AMERONGEN comprising an epoxy resin, sulfur amine compound, urea component, and dicyanodiamide for a fibrous material to be eligible for reinforcing

purposes in which there is retention of strength under load and moisture resistance (AMERONGEN - Col.1, lines 27-34).

Regarding claim 13, AMERONGEN discloses the contents of sulfur atom are 0.1 part to 10 parts per 100 part (by weight) of rubber containing epoxy (Col.4, lines 19-22) and a urea content of 2-10% by weight (Col.6, lines 30-31).

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over LI et al. (5,112,667), DENOMMEE et al. (3,956,447), and AMERONGEN (3,547,764) as applied to claims 1-13 and 15-21, and in further view of LAMMECK et al. (5,879,608).

The teachings of LI et al., DENOMMEE et al., and AMERONGEN are applied as described above for claims 1-13 and 15-21.

Regarding claim 14, AMERONGEN is silent to the said urea being of a granular material with 150 m or smaller average particle diameter. However, LAMMECK et al. discloses a molded article containing fiber-reinforce plastic material comprising epoxy resins (Col.2, line 21) and granular urea component of particle size 8 mm (Col.5, line 65), which is less than 150 m. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the urea component of AMERONGEN to be a granular urea component of particle size of less than 150 m as taught by LAMMECK et al. in order to produce high-quality structural molded articles (Col.1, lines 40-42).

Response to Arguments

1. Applicant's arguments filed September 19, 2008 have been fully considered but they are not persuasive.

Applicant argues on pages 7-10 of the Remarks regarding claim 1:

- a) Applicant's respectfully disagree with the Examiner's contentions and submit that it is impossible for an individual practicing the disclosure of Li to use the "separated flaps of the prepregs as positioning pieces."
- b) Claim 1 recites two pressing steps. Neither Denommee nor Li disclose forming the molded article through two pressings as recited by claim 1.

Examiner respectfully disagrees with the Applicant's above arguments and would like to point out the reason(s) as discussed in the rejection:

a) is silent to arranging the prepregs at predetermined portions of a press die using partially separated flaps of the prepregs as positioning pieces. However, LI et al. discloses that a plurality of patterns of said prepreg layers can be "laid-up", that is placed upon one another and placed into a compression type mold (press mold) (Col.4, lines 9-13). It would have been obvious to one of ordinary skill in the art to have arranged the prepregs on a press die using any type of positioning methods as long as the prepregs are positioned on the press mold to achieve the desired structure of the molded article. In addition, Figure 3 shows prepregs molded into the shell 12. It is inherent to position the separated flaps over the press mold to obtain the shape of the said shell 12.

b) LI et al. is silent to two pressing steps. However, DENOMMEE et al. discloses a two-step compression molding procedure (Col.4, lines 56-69). It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the method of producing a helmet (molded article) of a fiber-reinforced composite material of LI et al. to include a second compression molding step as taught by DENOMMEE et al. in order to remove substantially all gases from a preform during the first stage of the finish molding, the degassing avoids the formation of trapped pockets of gas in the final molded article with resulting weaknesses in the article (Col.4, lines 68 through Col.5, lines 1-2).

Conclusion

2. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stella Yi whose telephone number is 571-270-5123. The examiner can normally be reached on Monday - Thursday from 8:00 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571-272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SY

/Christina Johnson/

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Supervisory Patent Examiner, Art Unit 1791